Branches of Right Subclavian.—The internal mammary and transversalis colli arteries are very large, and have a diameter little less than an ordinary subclavian. The transversalis humeri is also large, and takes its origin from the third part of the subclavian.

1. *Transversalis colli.*—The posterior scapular branch takes its ordinary course along the vertebral costa of the scapula; its principal branches are directed inwards, three or four large trunks running inwards, and anastomosing directly with the large posterior branches given off from the intercostal arteries.

2. *Internal mammary.*—The branches given off from the outer side of this artery, and which run along the three or four upper intercostal spaces, are large, and anastomose directly with the anterior branches of the intercostal arteries. The musculo-phrenic forms free anastomoses with the diaphragmatic arteries of the abdominal aorta.

3. *Inferior thyroid* is larger than usual; its glandular branches are about their normal calibre; a branch runs downwards and forwards to the œsophagus, and meets an ascending branch, given off from the first aortic intercostal.

4. The *vertebral* is of little more than ordinary diameter.

5. The *superior intercostal* is about the size of the internal mammary and transversalis colli arteries; it gives off a large deep cervical branch, and then continues its course tortuously to the first intercostal space, at which point a large posterior branch is given off.

Branches of Left Subclavian.—The vessels of this side are given off just as on the right side, but their calibre is smaller. The subclavian on each side is reduced to at most half the diameter it had before the giving off of its trunks. The deep epigastric on each side is very large, having about the diameter of the corresponding internal mammary; very free anastomoses are formed between it and the last-named artery.

We find, therefore, that the principal communications by which the circulation was carried on are—

1. The *internal mammary*, anastomosing with the intercostal arteries by means of the musculo-phrenic and comes nervi phrenici, with the diaphragmatic of the abdominal aorta, and largely with the deep epigastric.

2. *Superior intercostal*, anastomosing anteriorly by means of a large branch with the first aortic intercostal, posteriorly with the posterior branch of the first aortic intercostal.

3. *Inferior thyroid.*—A branch, about the size of an ordinary radius, forms a communication between the first aortic intercostal and this vessel.

4. *Transversalis colli.*—Very large communications with the posterior branches of the intercostals. The size of this artery, with its large anastomosing branches, first led one to look for some obstruction.

6. The branches going to the side of the chest were large, and anastomosed freely with the lateral branches of the intercostals.

MATERIA MEDICA AND PHARMACY.

9. *Experiments on the Action of Pepsin.* By Edward H. Sieveking, Lect. on Mat. Med.—Those who have employed pepsin in the treatment of dyspepsia will probably be disposed to admit that it possesses a considerable therapeutic value. Into this question I do not now propose to enter; but as it is likely that the more extended use of the article, provided that we can secure its being properly prepared, will establish its claim to a permanent place in our materia medica, it may not be uninteresting to relate a few experiments that I have recently made with pepsin. The experiments were made with specimens of Boudault's pepsin,[1] of Trommsdorff's pepsin, and of Oberdörffer's[2] dried pig's stomach. Boudault's pepsin (poudre nutrimentive) is acid to the taste, and to litmus, owing

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[1] Obtained from Messrs. Squires', the Queen's Chemists.

[2] These two specimens were kindly supplied to me by Messrs. Hilgenberg and Schacht, of Houndsditch.

to the lactic acid it contains; it is a stone-gray powder, consisting mainly of starch and *débris* of epithelium, as shown respectively by the iodine test and the microscope. Trommsdorff's pepsin is also a stone-coloured powder, caking and gritty to the touch, strongly acid to the taste and to litmus paper, and very hygroscopic; under the microscope, the whole appeared composed of starch-granules of various sizes, which gave a blue reaction with iodine. On addition of water, the granules swelled, became ovoid, and showed faint concentric lines, with here and there a radiating fissure.

The dried scrapings of the pig's stomach also presented a stone colour, but of rather a more reddish hue; the substance was pulverulent and soft, acid to test paper, and consisting of epithelium and *débris* of animal tissue; not materially altered by the addition of acetic acid, and containing a few ovoid particles, which were blued by iodine.

Of each of these I weighed out two specimens of 4 grains each, and submitted cubic pieces of hard-boiled white of egg, of 20 grains each, in half an ounce of distilled water, to their action. To one specimen of each, one drop of strong hydrochloric acid was added, and the whole series was exposed to a temperature of 100° Fahr. The glasses were left for above twenty-four hours, and the following is a summary of the effects produced:—

The albumen treated with—

		Loss.
1.	Boudault's pepsin, weighed over 16 grs. . .	nearly 4 grs.
2.	“ “ with hydrochloric acid, weighed under 10 grs. . . .	above 10 “
3.	Trommsdorff's pepsin, weighed over 18 grs. . .	“ 20 “
4.	“ “ with hydrochloric acid, weighed over 12 grs. .	“ 8 “
5.	Pig's stomach, weighed over 20 grs.	
6.	“ “ “ 15 grs.	5 “

In the case of 2 and 4 the action was very marked, the edges of the albumen were rendered extensively clear and transparent. Nos. 1 and 3 looked as if they had scarcely been affected; No. 6 was slightly digested, but much less than Nos. 2 and 4. The albumen in Nos. 3 and 5 looked as if it had undergone no change, and it was manifest that No. 5 had even absorbed water, and had thus increased in weight. The liquid was in each case tested for albumen; feeble indications of its presence were afforded by the water of Nos. 2, 3, 4, 5, and 6.

About a fortnight after the last series of experiments I repeated them, with nearly the same results. The same quantities of white of egg and pepsin were used, two drops of hydrochloric acid were added to one specimen of each kind, and the whole was exposed for some hours to a temperature of 110° F., and the glasses shaken from time to time. At the termination of the experiment, the albumen in—

1.	Boudault's pepsin, weighed 15 grs.	5 grs. loss.
2.	“ “ with acid, weighed 12 grs. . .	8 “ “
3.	Trommsdorff's pepsin, weighed 17½ grs. . . .	2½ “ “
4.	“ “ with acid, weighed 17 grs. .	3 “ “
5.	Pig's stomach, weighed 21 grs.	1 gr. gained.
6.	“ “ with acid, weighed 8 grs. . . .	12 grs. loss.

It is stated in my notes that the liquid of Nos. 1, 2, and 4 gave feeble indications of the presence of albumen. The albumen in Nos. 2 and 6 had become translucent to a great extent, while the albumen in the other glasses remained opaque. The discrepancy between the two serials is, that in the second the action of the pig's stomach with the acid was so much greater than Trommsdorff's pepsin, or even than Boudault's. The two sets of experiments agree in demonstrating that in all instances the solvent power of the preparation was much promoted by the addition of the hydrochloric acid; and that imperfect pepsin (as in No. 5 in each set) not only does not promote, but actually retards, digestion. We must not, therefore, allow our dyspeptic patients, on the mere strength of the pepsin we prescribe, to take a larger quantity of food in the first instance than we should otherwise order, but make certain of the peptic power of the agent in the first instance, or we may aggravate instead of relieving his complaint. It is evident, also, that Boudault's is a powerful and trustworthy agent.

In submitting the above memoranda, I would only add that the conclusions I have arrived at in relation to the therapeutic value of pepsin corroborate those put forward by Drs. Corvisart and Ballard, and that I regard pepsin as an agent which we may in many diseases of malnutrition prescribe with great benefit to our patients.—*Med. Times and Gaz.*, April 4, 1857.

10. *Chemical and Physiological Properties of Pepsin.* M. Boudault read an interesting memoir on this subject before the *Société de Pharmacie* of Paris, of which the following is an abstract. Pepsin is a compound found in the gastric juice of animals, from which it is obtained as a syrupy substance, by simple evaporation. It is also precipitated in a neutral state by alcohol. Metallic salts throw it down without altering its physiological properties, which reappear when the pepsin is separated from the salts which have precipitated it. Gastric juice contains 1.25 of pepsin, and 1.75 of saline matters; the rest consists of water and lactic acid, which latter plays an important part in the phenomena of digestion. From his experiments M. Boudault concluded that pepsin is secreted in the neutral state, but that it is to its action as a ferment that the gastric juice owes its property of converting glucose into lactic acid. On the other hand, he proved that pepsin alone, that is, in the neutral state, cannot effect digestion; it is only when glucose is changed into lactic acid that digestion can take place. Hence the sequence will be, the salivary diastase transforms the amylaceous principles of the food into glucose, which is conveyed into the stomach; there this glucose meets all the elements necessary to its change into lactic acid, and especially pepsin, the principal agent in this modification, whence results the formation of gastric juice, and consequently digestion.

Lactic acid is not, however, the only acid capable of effecting digestion. Pepsin, acidulated with hydrochloric and acetic acids, also determines the formation of gastric juice; but digestion is never so complete as with pepsin, acidulated with lactic acid.

M. Boudault detailed some experiments demonstrating the equal efficacy of artificial gastric juice prepared by himself, from pepsin obtained from the rennet of the sheep, with that of the natural fluid obtained from dogs.

The employment of pepsin as a medicine was naturally suggested by its energetic action as a digestive substance. Dr. Corvisart, who was the first to use it, obtained satisfactory results, and it was the pepsin of herbivora which he employed (*Bulletin de Thérapeutique*, vol. 47, p. 320). M. Boudault administers pepsin mixed with starch, dried at a temperature of 212° F. In this form it can be mixed with a number of medicinal substances, which do not interfere with its therapeutic action. For example, with hydrochlorate of morphia, in cases of violent cardialgia; with strychnia, where it is desirable to stimulate the peristaltic motions of the stomach; with subnitrate of bismuth, lactate of iron, carbonate of iron, iodide of iron, reduced iron, &c.

Pepsin is very efficacious in dyspepsia, and in the derangements of digestion which usually attend recovery from serious or chronic diseases. Finally, it is a powerful digestive agent in cases of consumption from insufficient nourishment.

It is given in the first spoonful of soup, or before meals, rolled up in a wafer, and either in the acid or neutral state. In the former condition it replaces the gastric juice, when the latter is not secreted in sufficient quantity in certain morbid affections; in the neutral, that is, the slightly acidulated state, it is used in cases where the stomach contains too great a quantity of acid. It is a powerful remedy.—*Bulletin Général de Thérapeutique*, 30th January, 1857.

Dr. W. Stephens Squire gives the following as M. Boudault's process for the preparation of pepsin. The rennet bags of sheep are opened and reversed, and washed under a thin stream of water, to free them from alimentary matters, &c. The mucous membrane is then carefully scraped off with a knife, the cells are bruised in a mortar, and digested for twelve hours in distilled water. The liquid is then filtered, and neutral acetate of lead is added, which precipitates peptate of lead. This precipitate is collected and decomposed by means of sulphuretted hydrogen. Pepsin is thus liberated in solution, and is separated from the insoluble sulphide of lead by filtration. The filtered liquid represents neutral gastric juice. It is, however, necessary that it should be acid, and for this purpose lactic acid is added until the liquid exhibits the same degree of acidity as a specimen of gastric juice obtained from the stomach of a dog by means of a fistulous opening. If the artificial gastric juice thus obtained be evaporated to dryness, at a temperature not exceeding 100° F., a gummy mass is obtained, which attracts moisture from the air, and is altogether a very unfit article either for sale or administration. In order to reduce it to powder, M. Boudault simply evaporates his artificial gastric juice to a syrupy consistence, and to this he adds dried starch in such proportion that one gramme shall be capable of digesting four grammes of dry fibrin, when the two are submitted together in the presence of water to the temperature of the human body.

The substance thus produced is a fawn-coloured powder, cohering somewhat together, and possessing a peculiar taste and odour. It yields to water the lactic acid and the pepsin, producing a solution of a yellowish tint, with the colour, odour, and taste of gastric juice.—*Pharmaceutical Journal*, March, 1857.

11. *Therapeutic Employment of the Pyrophosphate of Iron.*—M. E. Robiquet read (Feb. 10th, 1857) an interesting memoir on this subject before the Imperial Academy of Medicine of France.

"Since," he remarked, "Mr. Graham made known the singular transformations produced by heat in phosphoric acid, chemists have carefully studied the saline combinations into which the acid, molecularly modified, is capable of entering. The most interesting of these salts are those formed by simple igneous fusion, and, therefore, called pyrophosphates, and for this reason that the pyrophosphoric acid corresponds to two equivalents of base. Industry has already derived great advantage from the property possessed by pyrophosphoric acid of combining with soda, and with gold or silver. In medicine, the pyrophosphate of iron has often been tried, and this might be expected, for oxide of iron undoubtedly reacts on the functions of the blood, and the elements of pyrophosphoric acid are found in the bones; but it has soon been given up on account of its liability to change, and of the great quantity of pyrophosphate of soda necessary to retain it in solution in water. It struck me that these inconveniences might be easily avoided without depriving the ferruginous salt of any of its essential properties.

In medicine the essential characters of a good preparation of iron are, that it shall readily dissolve in the fluids of the stomach without impairing their digestive functions, that it shall be completely assimilated in the system, and that it shall not act as an astringent. The pyrophosphate of iron possesses all these properties; its resistance to solvents is the sole difficulty which remains to be overcome to entitle it to the first rank among the preparations of iron.

In studying the molecular constitution of this remarkable salt, it is easy to see that it belongs to the class of bodies endowed with the character of polymorphism. Like sulphur, phosphorus, arsenious acid, and many other polymorphous substances, pyrophosphate of iron will therefore present great differences in its chemical properties, according to the process adopted in its preparation, and the temperature at which it has been obtained. By precipitating a solution of persulphate of iron with one of pyrophosphate of soda, taking care to operate at a temperature below 59° F., we obtain a gelatinous precipitate, which is nothing else than pyrophosphate of iron ($Fe_2 O_3 3Ph O_5$), dissolving with the greatest facility in a solution of pyrophosphate of soda. If the ferruginous salt were obtained at a temperature above that just mentioned, and, *à fortiori*, at a boiling heat, a considerable quantity of pyrophosphate of soda would be required, and still we should obtain only an unstable solution, acquiring a black colour, and having an insupportable taste. In fact, whatever precaution we take, not less than four parts of pyrophosphate of soda are required to dissolve sixteen of the gelatinous ferruginous precipitate, representing three parts of the salt dried at 212°. When the solution is prepared in the cold, it keeps for some time without change, and might be converted into a syrup which would keep tolerably well in close vessels for one or two months. However, such a mixture contains too large a proportion of pyrophosphate of soda, which gives it a disagreeable saline taste, and does not prevent it, after a longer or shorter interval, from blackening on exposure to the air, and acquiring a more and more decided metallic taste. It was, therefore, necessary to seek for another solvent. That which I have found to succeed best is the citrate of ammonia, a salt which has the double advantage of being capable of employment in very small quantity, and of chemically concealing iron from reagents.

The solution of pyrophosphate of iron in a citro-ammoniacal liquor keeps for whole months without undergoing any change, and yields a syrup free from the intolerable taste of ferruginous compounds. Potash, ammonia, and the alkaline carbonates, do not give, with pyrophosphate of iron so dissolved, the reaction peculiar to the salts of iron.

MM. Dumas, Laurent, and Gerhardt, in their valuable researches on the theory of substitution, have shown that it is possible, in a number of organic compounds, to substitute iodine, bromine, or chlorine, for hydrogen, without disturbing the molecular equilibrium, or the chemical reactions of the fundamental compound. Thus, in chloruretted alcohol or chloral, nitrate of silver produces no turbidity, because the chlorine of the chloral behaves, not as the chlorine of hydrochloric acid, or of a metallic chloride, but as the hydrogen of which it has taken the place. Now, destroy the chloral, either by combustion by nitric acid, or by any other energetic oxidizer, and you will rediscover the chlorine with all its characteristic reactions. In like manner, in the salt of which I am treating, the iron is chemically concealed; its presence is no longer manifested by the most sensitive reagents; potash and ammonia no longer precipitate it as an oxide; and its properties are so masked that it is necessary completely to break up its molecule in order to be able to estimate the iron, or to discover its reactions.

If I enter a little at length into this subject, it is because I am persuaded that therapeutics will one day derive the greatest advantage from medicines, the active element of which is chemically concealed. Such compounds are, in fact, very slowly disaggregated in the process of digestion, and the system, absorbing them atom by atom, will conceal them integrally.

The process of solution being once found, nothing is easier than to transform the pyrophosphate of iron into comfits, syrup, or lozenges; the latent state in which it exists in this new salt enables us to mix it with wine of bark, and to obtain from it a powerful tonic, without having to fear the blackish discoloration and inky taste which are always produced when a salt of iron is brought into contact with fluids more or less highly charged with tannin.

In whatever mode the citro-ammoniacal pyrophosphate of iron be administered, it has absolutely no taste, and patients not only bear it readily, but feel the best effects from its use. I have seen it particularly useful in well-marked cases of anæmia, chlorosis, and chronic urethritis.

To recapitulate, the pyrophosphate of iron, chemically considered, is a polymorphous salt, in which the metallic atom is concealed from reagents; it contains, by weight, 21.11 per cent. of iron. In a therapeutic point of view, the facility with which it is assimilated by the system, the absence of all styptic taste, its perfect solubility in water, the influences, finally, which it exercises on the composition of the bones and the functions of the blood, entitle it to the first rank among ferruginous compounds.

FORMULÆ. *Syrup of Iron.*—Pyrophosphate of iron, two and a half drachms; simple syrup, twenty-nine ounces; syrup of orange flowers, three ounces: make a syrup by simple solution, and colour with a sufficient quantity of tincture of cochineal or alkanet. Each drachm of the syrup contains about six-tenths of a grain, and a tablespoonful about three grains, of the salt of iron.

Ferruginous Comfits.—Pyrophosphate of iron, one ounce and five drachms; divide into 500 comfits, each of which shall contain a grain and a half of the salt.

Ferruginous Wine of Bark.—Pyrophosphate of iron, two and a half drachms; extract of pale bark, seventy-seven grains; white wine, thirty-two ounces; to be made *secundum artem.*"—*Journ. des Connaissances Méd. et Pharm.*, Feb. 20, 1857.

12. *Therapeutic Properties of Iodide of Potassium.*—MM. Demarquay and Gustin communicated to the Imperial Academy of Medicine (April 7, 1857) a note on this subject. They state that the favourable effects obtained from the use of the chlorate of potash in different affections of the buccal mucous membrane, have led them to inquire whether the therapeutic properties of this salt were not common to other salts having a striking chemical analogy with it. Profiting by this idea they have tried the past year, in the service of M. Monod, the iodide of potash, and they state that their confidence in it augments daily. They think it may replace the chlorate of the same base, the iodide acting more promptly, more energetically, and in a less dose than the chlorate. Further, they say that the iodide has been beneficial where the chloride had failed.—*Moniteur des Hôpitaux*, April 11, 1857.

13. *Employment of Amylene for Children.*—M. Giraldes, as the result of the employment of amylene in place of chloroform in the cases of twenty-five children of different ages, draws the following conclusions: 1. It is respired more easily and with less struggling than chloroform. 2. Anæsthesia takes place very rapidly. 3. The sleep is more calm and natural, and is unaccompanied by stertor. 4. The patients rapidly return to their normal conditions. 5. It does not induce nausea, vomiting, or cerebral congestion. 6. The patients suffer no inconvenience afterwards, recovering all their cheerfulness.—*Comptes Rendus*, No. 10, 1857.

14. *External Use of Clay.*—Dr. Betz employs clay mixed with water, and spread some lines in thickness upon rag, as a poultice in cutaneous, cellular, and lymphatic inflammations, in panaritis, periostitis, periphlebitis, etc. The application must be often renewed. He believes its utility is attributable to the great affinity the clay has for water, so that, sprinkled upon suppurating surfaces, it quickly causes the absorption of the fluids, and the formation of a crust. So, also, it absorbs water through the uninjured skin, which becomes wrinkled. Its influence may be further attributed to its low temperature.—*Med. Times and Gaz.*, April 4, 1857, from *Schmidt's Jahrb.*, Bd. 93.

MEDICAL PATHOLOGY AND THERAPEUTICS, AND PRACTICAL MEDICINE.

15. *On the Diseases of the Army of the East during the winter of* 1854–5.—By Dr. Tholozan. When the sickness began to show itself in large proportions in the French army, M. Tholozan was among the civilians dispatched by the Government to the seat of war. In the present paper he presents to the Académie de Médecine a succinct account of some of the facts he observed at Constantinople from December, 1854, to March, 1855. During this period, he received about 1200 patients sent from the Crimea. In about a fourth of these, the affections were slight and easily treated; but 900 were the subjects of severe disease, and of these 290 died.

The diseases which gave rise to this mortality were the same that filled all the other hospitals of the Crimea and Constantinople, viz., cholera, dysentery, scorbutus, and typhus. The cholera, here as in other armies, was due to an